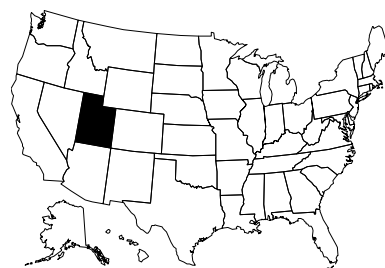


UTAH

Contact Information

Thomas W. Toole, Environmental Scientist
Richard Denton, Manager
Utah Department of Environmental Quality (UDEQ)
288 N. 1460 W., P.O. Box 144870 ■ Salt Lake City, UT 84114-4870
Phone 801/538-6146 ■ Fax 801/538-6016
email: ttoole@utah.gov and rdenton@utah.gov
UDEQ Division of Water Quality homepage: <http://waterquality.utah.gov/>



Program Description

Prior to 2001, The Utah Division of Water Quality (DWQ) Biological Assessment program was limited to benthic macroinvertebrate data collected at 18 long-term monitoring sites. They have been sampled since 1978 with the exception of about five years in which the allocation of the 18 samples were used to supplement water chemistry and physical data collected in the five-year basin rotation monitoring plan. These samples were collected to ascertain long-term water quality and to be used in determining trends. In addition, benthic macroinvertebrate samples were collected at 16 Nonpoint Source Project sites to assess the effects of BMP implementation. These data have been incorporated into several NPS reports to determine what improvements in water quality have occurred. Data collected from the 18 long-term monitoring sites and the NPS projects have been used in making beneficial use assessments (305(b)) and listing waters on the 303(d) list.

In 2001, the DWQ reviewed its bio-monitoring program and decided that a major effort was needed to improve and develop new components of its water quality assessment program. During this review, an inventory of benthic macroinvertebrate data collected by DWQ, the U.S. Bureau of Land Management (BLM), and the U.S. Forest Service (USFS) was completed. Upon completion of this review, the DWQ contacted the BLM and USFS and requested all of the benthic macroinvertebrate data that they had collected from 1990 through 1997 be sent to DWQ for entering into STORED. These data, along with DWQ's, were entered into STORET. Data collected since 1997 have been stored electronically and a program to electronically transfer these data into STORET is being developed. These data will be evaluated as to their usefulness in establishing reference sites and the development of metrics to be used in assessing beneficial use support.

In 2001, the DWQ negotiated an agreement to complete the E-MAP sampling for EPA within the State. Experience obtained from this work would allow environmental scientists (field and staff) to learn and evaluate the methods used in the E-MAP protocol. This experience could then be used to develop a bioassessment protocol for assessing waters within the State.

Concurrent with doing the E-MAP work, the Division decided to commit additional resources to develop reference sites for bioassessment work. It was decided that the DWQ would select and try to sample up to 60 potential reference sites during the next 2-3 years. Water chemistry, fish, benthic macroinvertebrate, periphyton, and physical habitat data will be collected at these sites. The selection of sites were based upon the different ecoregions within the state and the need for low elevation, low-gradient stream reference sites.

DWQ is also assisting the EPA Corvallis Lab in reviewing and selecting reference sites that were initially selected using GIS techniques. Approximately 100 sites were initially selected and the number has been reduced to 20 sites. The DWQ is assisting in sampling these sites. Information obtained from this program will be evaluated and possibly incorporated into the Division's bio-assessment program.

The DWQ has committed to developing a set of reference sites and metrics that can be used to ensure that the waters of the State are assessed in a scientifically sound and standard method. Work is also going on to evaluate other assessment methods such as RIVPACS in assessing beneficial use support.

Documentation and Further Information

Utah Water Quality Assessment Report to Congress, September 2000 and Year 2000 Water Quality Inventory, 305(b) Assessment:
http://www.waterquality.utah.gov/2000_305b_fact.pdf

Utah Division of Water Quality's 2000 Water Quality Monitoring Program:
http://www.waterquality.utah.gov/monitoring/complete_monitor_plan_2000.pdf

Utah's 2000 303(d) List of Waters, October 2000: http://www.waterquality.utah.gov/documents/approved_2000_303d.pdf

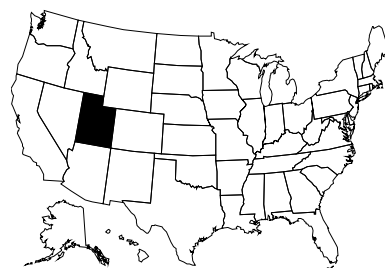
DRAFT, Utah's 2002 303(d) List of Waters: <http://www.waterquality.utah.gov/documents/2002303dinternet.pdf>

Quality Assurance and Standard Operating Procedures Manual. Utah Department of Environmental Quality, Division of Water Quality. 1993. Utah Department of Environmental Quality, Salt Lake City, UT.

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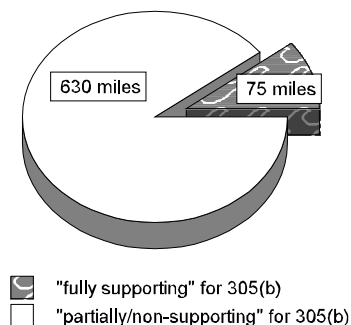
Programmatic Elements

Uses of bioassessment within overall water quality program	<input checked="" type="checkbox"/>	problem identification (screening)
	<input checked="" type="checkbox"/>	nonpoint source assessments
	<input checked="" type="checkbox"/>	monitoring the effectiveness of BMPs
	<input checked="" type="checkbox"/>	ALU determinations/ambient monitoring
	<input type="checkbox"/>	promulgated into state water quality standards as biocriteria
	<input type="checkbox"/>	support of antidegradation
	<input type="checkbox"/>	evaluation of discharge permit conditions
	<input checked="" type="checkbox"/>	TMDL assessment and monitoring
	<input type="checkbox"/>	other:
Applicable monitoring designs	<input checked="" type="checkbox"/>	targeted (i.e., sites selected for specific purpose) (<i>special projects, specific river basins or watersheds and comprehensive use throughout jurisdiction</i>)
	<input checked="" type="checkbox"/>	fixed station (i.e., water quality monitoring stations) (<i>special projects, specific river basins or watersheds and comprehensive use throughout jurisdiction</i>)
	<input type="checkbox"/>	probabilistic by stream order/catchment area
	<input type="checkbox"/>	probabilistic by ecoregion, or statewide
	<input checked="" type="checkbox"/>	rotating basin (<i>specific river basins or watersheds and comprehensive use throughout jurisdiction</i>)
	<input type="checkbox"/>	other:

Stream Miles

Total miles	85,916
<i>(determined using the National Hydrography database and state based determination)</i>	
Total perennial miles	14,000+
Total miles assessed for biology*	705
fully supporting for 305(b)	75
partially/non-supporting for 305(b)	630
listed for 303(d)	300
number of sites sampled (<i>on an annual basis</i>)	~56
number of miles assessed per site	12.6

705 Miles Assessed for Biology



*Biological data were used along with water chemistry data to assess the above listed miles. The biological assessment was done using benthic macroinvertebrates and used a weight-of-evidence assessment because reference sites were not used. Diversity indices, the Biotic Condition Index, and the number of sediment and nutrient tolerant taxa were used to determine beneficial use support when the pollution indicator value for total phosphorus was exceeded.

Aquatic Life Use (ALU) Designations and Decision-Making

ALU designation basis	Class System (A,B,C)
ALU designations in state water quality standards	Five designations*
Narrative Biocriteria in WQS	none - Procedures used to support general aquatic life statement in WQS are not standardized, but are primarily based on best professional judgment using some metrics.
Numeric Biocriteria in WQS	none
Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria)	<input checked="" type="checkbox"/> assessment of aquatic resources <input type="checkbox"/> cause and effect determinations <input type="checkbox"/> permitted discharges <input checked="" type="checkbox"/> monitoring (e.g., improvements after mitigation) <input checked="" type="checkbox"/> watershed based management
Uses of bioassessment/biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU	Used primarily in assessing 319 nonpoint source projects including assessment, implementation of BMPs, and evaluation of water quality

*The designations are as follows: 3A - cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food web. 3B - warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food web. 3C - Nongame fish and other aquatic life including the necessary aquatic organisms in their food chain. 3D - Waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain. 3E - Severely habitat-limited waters.

Reference Site/Condition Development**

Number of reference sites	not applicable
Reference site determinations	<input type="checkbox"/> site-specific <input type="checkbox"/> paired watersheds <input type="checkbox"/> regional (aggregate of sites) <input type="checkbox"/> professional judgment <input type="checkbox"/> other:
Reference site criteria	
Characterization of reference sites within a regional context	<input type="checkbox"/> historical conditions <input type="checkbox"/> least disturbed sites <input type="checkbox"/> gradient response <input type="checkbox"/> professional judgment <input type="checkbox"/> other:
Stream stratification within regional reference conditions	<input type="checkbox"/> ecoregions (or some aggregate) <input type="checkbox"/> elevation <input type="checkbox"/> stream type <input type="checkbox"/> multivariate grouping <input type="checkbox"/> jurisdictional (i.e., statewide) <input type="checkbox"/> other:
Additional information	<input type="checkbox"/> reference sites linked to ALU <input type="checkbox"/> reference sites/condition referenced in water quality standards <input type="checkbox"/> some reference sites represent acceptable human-induced conditions

**Utah is currently working with the EMAP to develop reference sites.

Field and Lab Methods

Assemblages assessed	<input checked="" type="checkbox"/>	benthos (<i><100 samples/year; multiple seasons, multiple sites – broad coverage for watershed level</i>)
	<input type="checkbox"/>	fish
	UD	periphyton (<i>A periphyton program is under development and will be used primarily in nutrient-impacted streams. Dr. Sam Rushforth, at Utah Valley State College, is assisting in the development of this program.</i>)
	<input type="checkbox"/>	other:
Benthos		
sampling gear	rock baskets and Hess; 200-400 micron mesh	
habitat selection	riffle/run (cobble) and artificial substrate	
subsample size	300 count	
taxonomy	combination	
Habitat assessments	quantitative measurements, and a few nonpoint source project sites have pebble counts, channel profiles and riparian condition evaluated on a very limited basis; performed with bioassessments	
Quality assurance program elements	standard operating procedures and quality assurance plan	

Data Analysis and Interpretation

Data analysis tools and methods	<input checked="" type="checkbox"/>	summary tables, illustrative graphs
	<input type="checkbox"/>	parametric ANOVAs
	<input type="checkbox"/>	multivariate analysis
	<input checked="" type="checkbox"/>	biological metrics (<i>return single metrics - use endpoint for each single metric</i>)
	<input type="checkbox"/>	disturbance gradients
	<input checked="" type="checkbox"/>	other: some tolerance information is used in the evaluation
Multimetric thresholds*		
transforming metrics into unitless scores	BCI Methods described by USFS are used to differentiate higher quality waters, less discriminating in impaired waters.	
Evaluation of performance* characteristics <i>Not currently evaluated</i>	<input type="checkbox"/>	repeat sampling
	<input type="checkbox"/>	precision
	<input type="checkbox"/>	sensitivity
	<input type="checkbox"/>	bias
	<input type="checkbox"/>	accuracy
Biological data**		
Storage	Data are currently being loaded into STORET	
Retrieval and analysis	SAS (metrics are calculated by the contracting laboratory using spreadsheets or another computer program—language not known)	

*EPA is currently having a contractor review benthic macroinvertebrate data to determine what metrics might apply to various regions of the State. Any metrics presently being used are those produced by the contracting laboratory and best professional judgement is used in the interpretation. No metric sensitivity analyses, regional biases, or other evaluations have been done to this point.

**EPA's Assessment Database is being used to store and retrieve assessment information for Utah's 305(b) report. Some indexing of waterbodies still needs to be done, but this should be completed during fiscal year 2002.